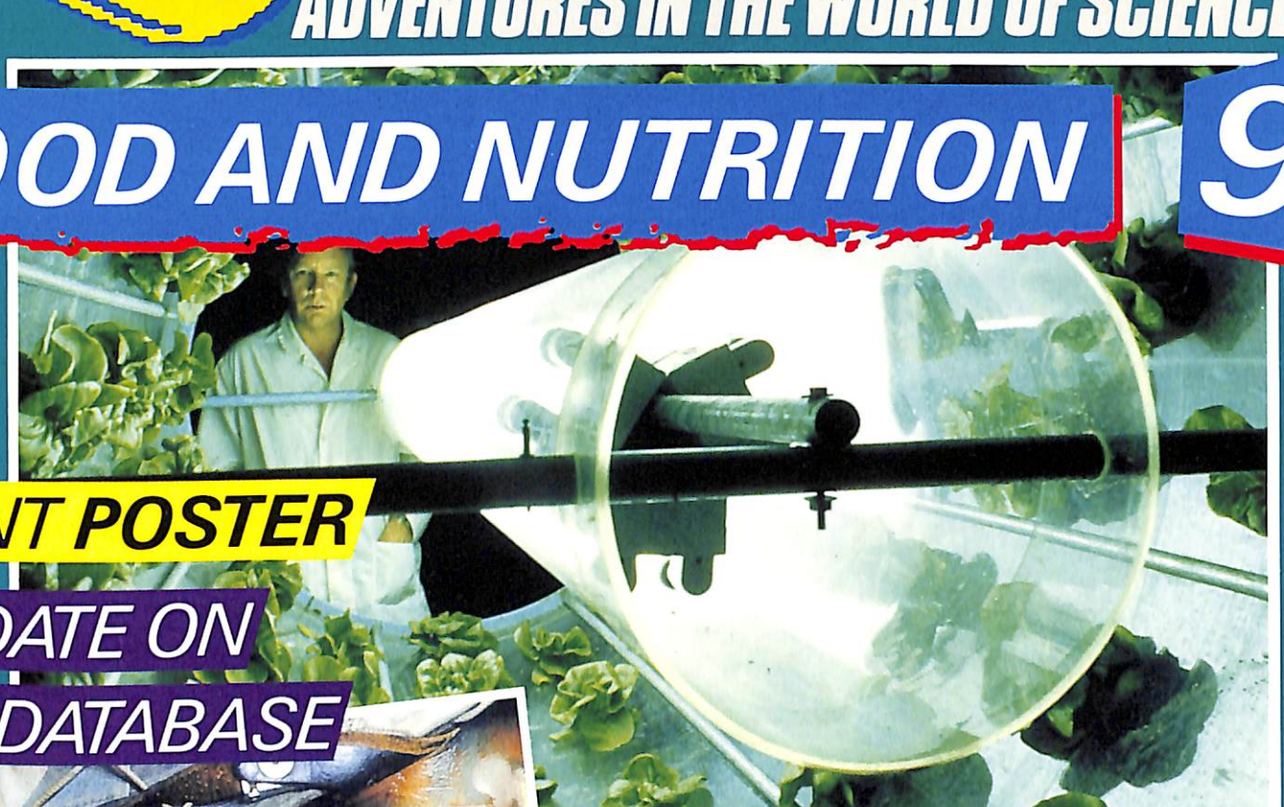
A Marshall Cavendish Collection

EVERY FORTNIGHT

QUEST

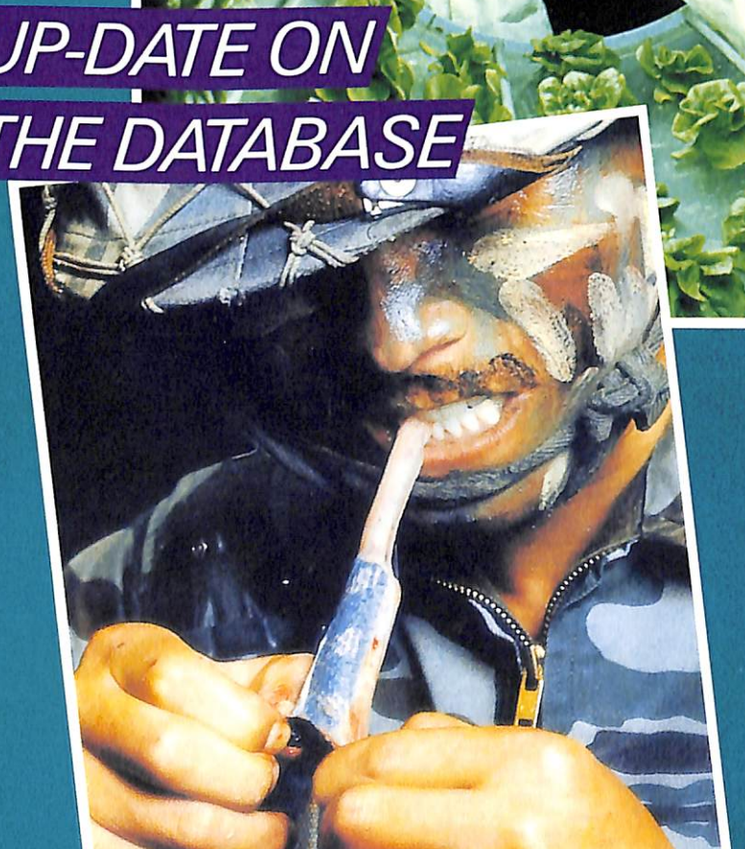
ADVENTURES IN THE WORLD OF SCIENCE

FOOD AND NUTRITION 9



GIANT POSTER

UP-DATE ON THE DATABASE



FACT FILES ON:

- Proteins of the future
- Freezing and dehydration
- Intensive farming
- Hunting for food
- Bizarre animal diets
- Body fuel

THREE PROJECTS

EIGHTEEN MORE Q & A CARDS

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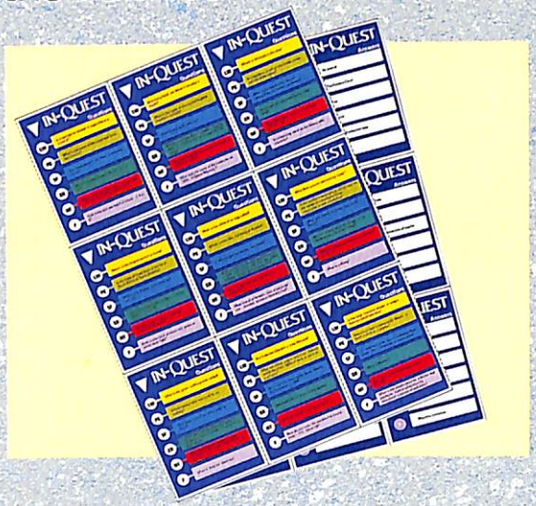
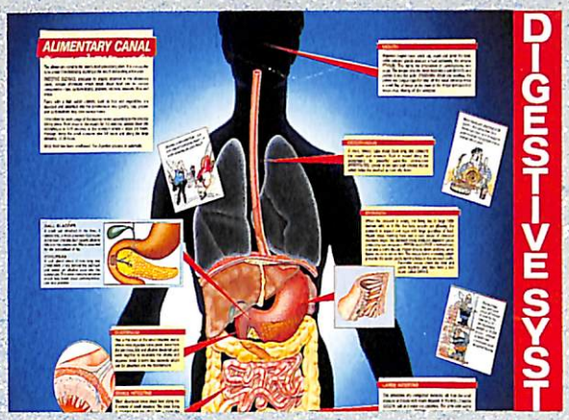
INSIDE THIS PACK

FACT FILES

▶ Fuel for life ▶ Sci-fi foods ▶ Trained to survive ▶ Weird diets ▶ Supermarket 2000 ▶ Processes for preservation ▶ Intensive farming ▶ Tipping the balance



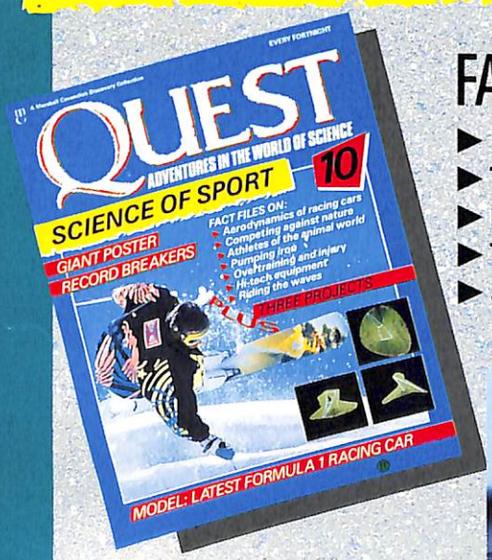


POSTER The digestive system

PROJECTS

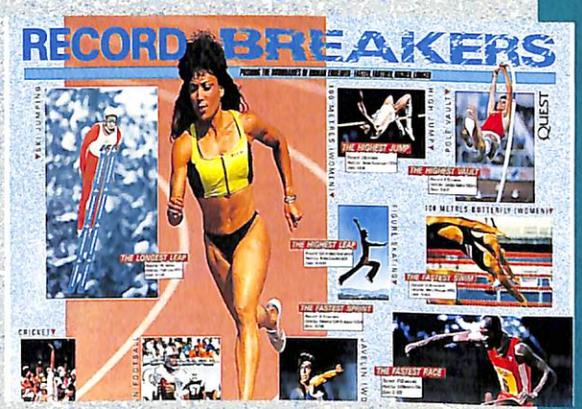
- Litmus test
- Yeast in action
- Calculate water content

COMING IN QUEST 10 SCIENCE OF SPORT



FACT FILES INCLUDE:

▶ Power racing
▶ Testing performance
▶ Dynamics of skiing
▶ Training methods
▶ Steroids and drug abuse



POSTER Record breakers

PLUS

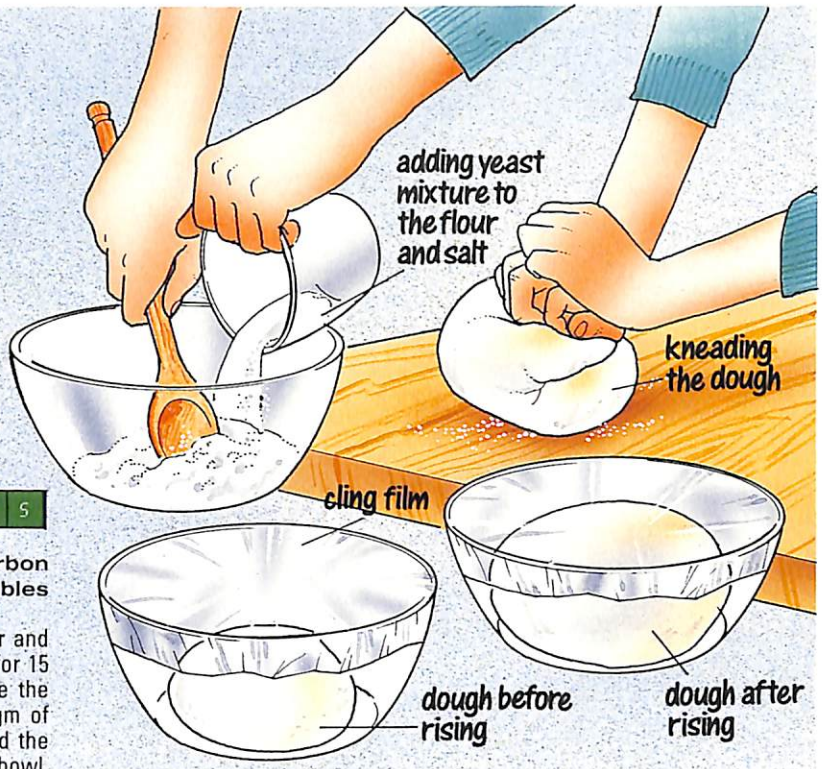
Model – make a top Formula 1 racing car

ISSN 1350-3766

PROJECTS

FOOD

- Why does yeast make bread dough swell?
- What proportion of water does our food contain?
- How many substances that we consume are acids?

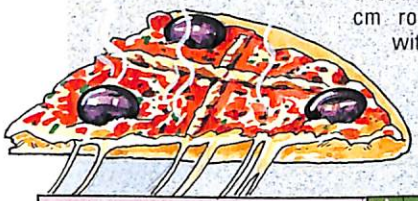


YEAST IN ACTION

1 2 **3** 4 5

Yeast reacts with sugar, causing carbon dioxide gas to be given off – bubbles formed in the dough make it rise.

Dissolve 5 ml of sugar in 125 ml of warm water and add 7.5 ml of active dried baking yeast. Leave for 15 minutes – bubbles of carbon dioxide will make the mixture frothy. Mix the yeast liquid with 250 gm of plain white flour, sifted with 5 ml of salt. Knead the dough until it feels smooth. Place it in an oiled bowl, cover with cling film and leave in a warm place for about one hour. The yeast will change the flour starch into sugar, then react with it to form more carbon dioxide. When dough has doubled in size, punch it down, knead it briefly and leave it, covered, for ten minutes. Place the dough on an oiled baking sheet and roll it out to a 23 cm round. Cover the top with tomato sauce and grated cheese. Bake at 220°C, 425°F (gas mark 7) for 15-20 minutes.



LITMUS TEST

1 2 **3** 4 5

Strong acids are extremely dangerous to drink. But some liquids that we consume are slightly acidic. Find out which by doing litmus tests.

Chemists use paper soaked in a dye called litmus to indicate which substances are acid, alkali or neutral. Litmus paper goes red in acids and blue in alkalis. Neutral solutions – neither acid nor alkali – cause no colour change.

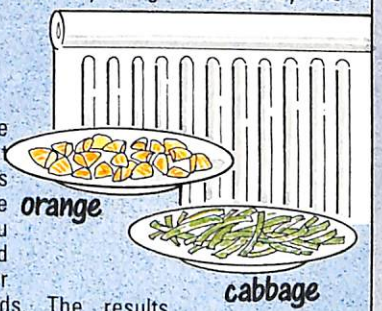
Buy litmus paper or try using white blotting paper soaked in a solution of blackberry jam and dried. If the bought litmus is blue, dip a piece in vinegar – the paper should turn red, showing that vinegar is an acid. If the litmus paper is red, dip in a solution of bicarbonate of soda dissolved in water. As the solution is an alkali, the paper should turn blue. Now try testing other liquids with red and blue litmus paper.

CALCULATE WATER CONTENT

1 2 **3** 4 5

We get the water our bodies need from food as well as drink. Try this simple test to see how much water some common foods contain.

Peel a large orange, discard the peel and weigh the rest. Put the orange on to a plate and cut it up into small pieces. Take about the same quantity of cabbage, weigh it, place it on another plate and cut it up too. Then put the plates in a warm place for several days until the water has evaporated from the food, leaving it completely dry. Now weigh the food again. This is the dry weight. The percentage of solid materials in the original food is equal to 100 times the dry weight divided by the original weight. So the percentage of water that was in the original food is equal to 100, minus the percentage of solids. You may be surprised to find just how much water there is in many foods. The results you get will be approximate, as some other substances besides water may evaporate from the food.



PROJECT INFORMATION

1 2 **3** 4 5

Each ***QUEST*** *project has been given its own difficulty rating:* **1** *very simple* **2** *simple* **3** *intermediate* **4** *advanced* **5** *complicated.*

WARNING!

Parents should ensure that experiments involving sharp tools, water and electricity are supervised. The publisher can accept no responsibility for any injury.

DATAQUEST

FLIGHT: SIGNIFICANT DATES

Event	Personality	Date
First balloon flight	Montgolfier Brothers	1783
First heavier-than-air flight	Wright Brothers	1903
First heavier-than-air flight in Europe	Albert Santos-Dumont	1906
First Channel crossing by heavier-than-air machine	Louis Blériot	1909
Aircraft exceeds 100 mph	Jules Védrine	1912
Vickers F.B.5 (Gunbus) is first aircraft designed to carry machine gun armament		1913
Total of 177,000 military aircraft built by end of First World War		1918
First non-stop Atlantic crossing in Vickers Vimy	Alcock and Brown	1919
First solo Atlantic crossing	Charles Lindbergh	1927
First flight across Pacific	Charles Kingsford Smith	1928
First jet flight in Heinkel He 178	Erich Warsitz	1939
Messerschmitt Me-262 is first jet-propelled aircraft to be used in combat		1944
Second World War aircraft production exceeds 675,000		1945
Vickers Viscount is first turboprop aircraft to enter service	George Edwards	1950
De Havilland Comet is first pure jet to enter service	Geoffrey de Havilland	1952
Comet 4 is first jet passenger aircraft to cross Atlantic in passenger service		1958
Boeing 747, first wide-bodied passenger aircraft, makes first flight		1969

FOOD: NATIONAL DISHES

Country	Dish	Description
Australia	Pavlova	meringue cake topped with fruit
Austria	Wiener schnitzel	thin veal escalopes coated in breadcrumbs and shallow-fried
Belgium	Carbonnade	beef cooked with beer and onions
China	Dim sum	savoury dumplings
England	Fish and chips	cod coated in batter and deep fried, served with potato chips
France	Coq au vin	Chicken and vegetables cooked in wine
Germany	Würst	sausage
Greece	Moussaka	minced lamb layered with aubergines
Hungary	Goulash	beef stew with paprika
India	Dal	spiced lentils or split peas
Israel	Falafel	spicy chick pea patties
Italy	Spaghetti Bolognese	pasta strips with minced beef and tomato sauce
Japan	Sashimi	very fresh raw fish
Malaysia	Satay	small meat or fish kebabs, served with peanut sauce
Mexico	Guacamole	thick purée of avocado
Spain	Paella	seafood, chicken and vegetables simmered with rice and saffron
Tunisia	Cous-cous	semolina with mutton stew
Turkey	Shashlik	spicy minced lamb kebabs
USA	Hamburger	minced beef burger in a bun
USSR	Borscht	beetroot soup

WEAPONS: ARMED FORCES OF THE WORLD

COUNTRY	ARMY	SHIPS	AIRCRAFT
USA	867,800	298	6000
Russia	1.4m	442	5375
Ukraine	150,000	57*	458
UK	152,000	64	664
France	264,000	58	1005
Germany	316,000	36	790
Italy	230,800	37	487
Spain	153,000	24	256
Turkey	454,00	32	608
Israel	175,000	3	755
Egypt	290,000	9	583
Syria	300,000	5	756
Iraq	350,000	1	436
Iran	305,000	9	271
China	2.3m	100	5,923
Vietnam	700,000	7	205
Japan	156,000	81	674
India	1.1m	43	831
Brazil	211,000	24	333
Argentina	38,000	17	240
Mexico	138,000	3	147
Angola	120,000	–	186
Nigeria	62,000	2	112
South Africa	49,900	3	273

NB. Naval figures are for subs and major surface units only. Army figures include Marines but not reserve or paramilitary forces. *Ukraine's fleet, or part of it, may soon revert to Russian control.

ALIMENTARY CANAL

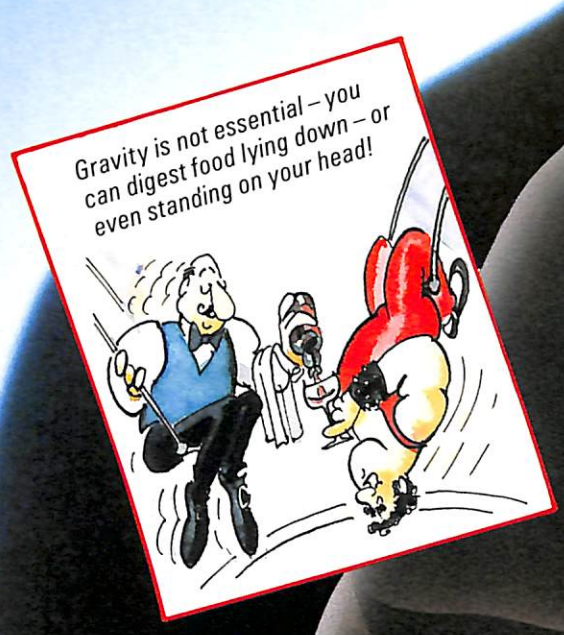
The alimentary canal is the body's food processing plant. It is a muscular tube, about 10 metres long, starting at the mouth and ending at the anus.

DIGESTIVE ENZYMES, produced by organs attached to the alimentary canal, contain chemicals which break down food into its various components – fats, carbohydrates, proteins, vitamins, minerals, fibre and water.

Foods with a high water content, such as fruit and vegetables, are digested and absorbed into the bloodstream very quickly; fats, protein and carbohydrate may take several hours.

Time taken for each stage of the journey varies according to the process taking place. Food stays in the mouth for 1-3 minutes, passes down the oesophagus in 5-10 seconds to the stomach where it stays 2-6 hours. Passage along the small intestine take 5-6 hours and along the large intestine, 12-24 hours.

Once food has been swallowed, the digestive process is automatic.

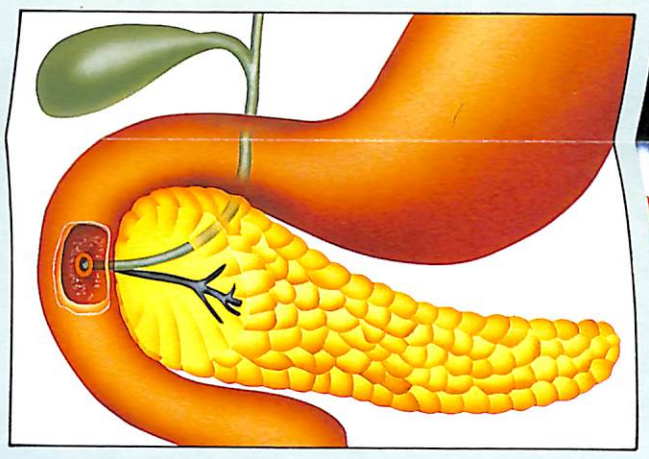


GALL BLADDER

A small sac attached to the liver; it stores bile, a thick greenish fluid made in the liver. The bile duct squirts alkaline bile into the duodenum. Bile is essential for the breakdown of fat.

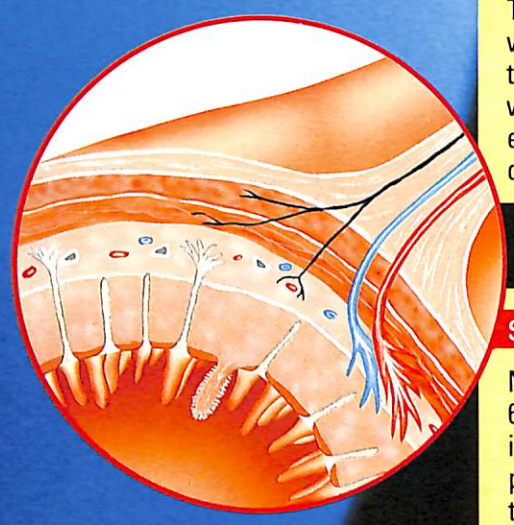
PANCREAS

A soft gland about 12.5cm long and 2.5cm thick, it lies behind the stomach and sends an alkaline juice into the duodenum. This juice contains enzymes which help break down carbohydrates, fats and proteins.



DUODENUM

This is the start of the small intestine and is where most digestion takes place. Juice from the pancreas, bile and alkaline duodenal juice work together to neutralize the chyme and enzymes break it down into nutrients which can be absorbed into the bloodstream.



SMALL INTESTINE

Most absorption takes place here along the 6 metres of small intestine. The inner lining is covered with tiny VILLI (left) – finger-like projections which act like a towel soaking up the food molecules and transporting them to the bloodstream.

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EVERY FORTNIGHT

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

SCIENCE OF SPORT

10

GIANT POSTER

RECORD BREAKERS

FACT FILES ON:

- Aerodynamics of racing cars
- Competing against nature
- Athletes of the animal world
- Pumping iron
- Overtraining and injury
- Hi-tech equipment
- Riding the waves

PLUS

THREE PROJECTS

MODEL: FORMULA 1 RACING CAR

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RECORD BREAKERS

STORIES OF HUMAN ENDEAVOUR - FASTER, FARTHER, HIGHER, LONGER

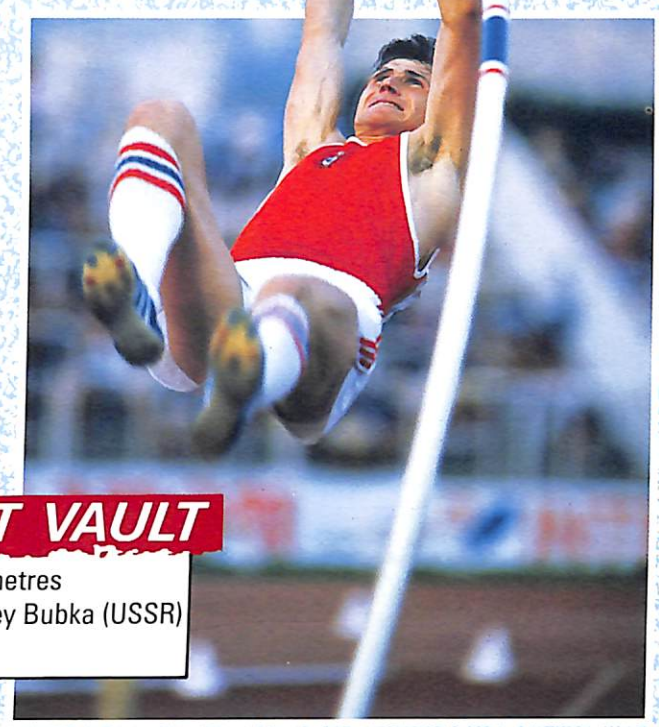
100 METRES (WOMEN)

HIGH JUMP

THE HIGHEST JUMP

Record: 2.43 metres
Held by: Javier Sotomayer (CUB)
Date: 8.9.88

POLE VAULT



THE HIGHEST VAULT

Record: 6.03 metres
Held by: Sergey Bubka (USSR)
Date: 23.6.87

QUEST

FIGURE SKATING

THE HIGHEST LEAP

Record: 5.81 metres (axel jump)
Held by: Robin Cousins (GB)
Date: 16.11.83

100 METRES BUTTERFLY (WOMEN)

THE FASTEST SWIM

Record: 57.93 seconds
Held by: Mary Meager (USA)
Date: 13.8.81

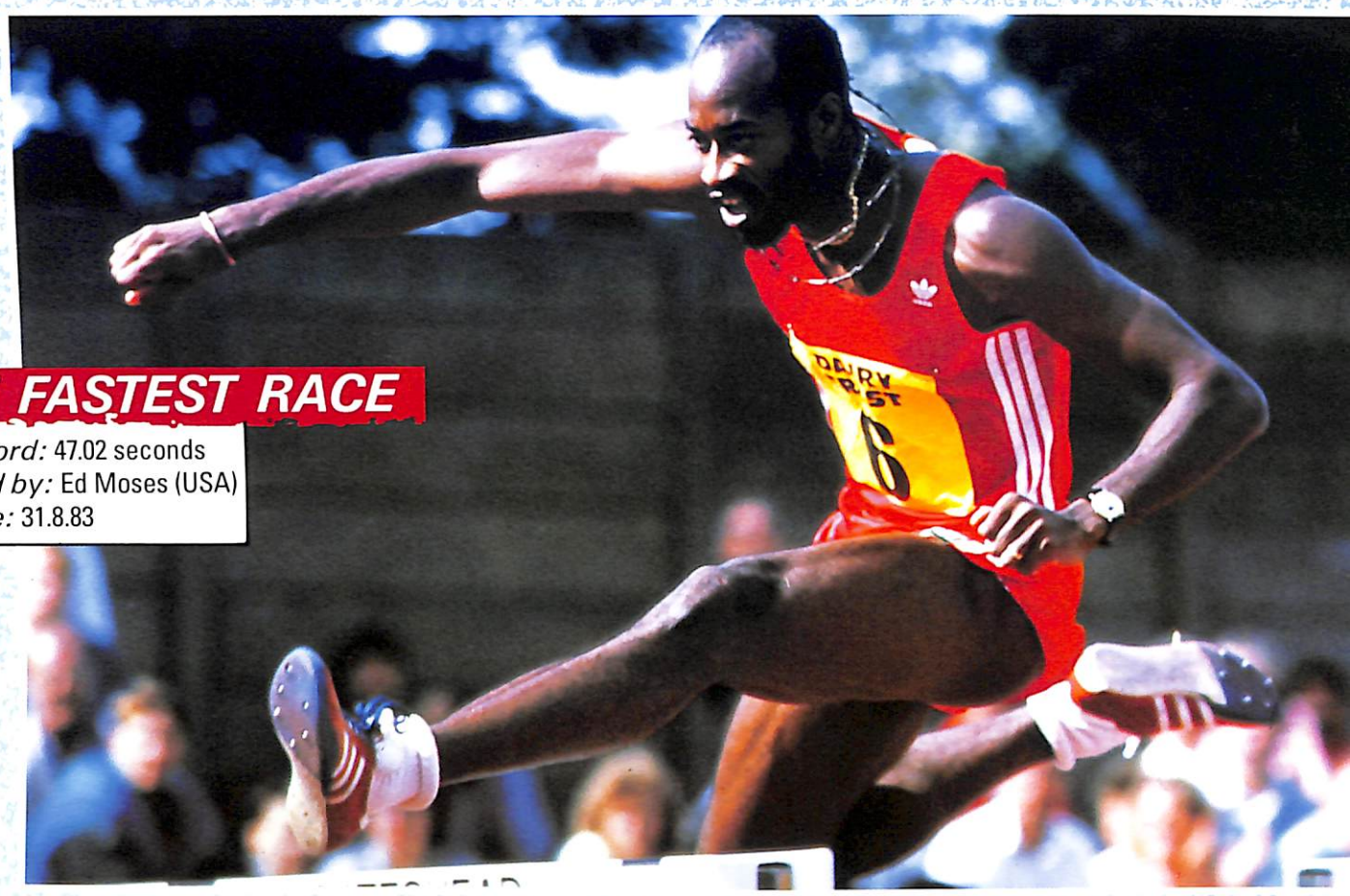
THE FASTEST SPRINT

Record: 10.49 seconds
Held by: Florence Griffith-Joyner (USA)
Date: 16.7.88

JAVELIN (WOMEN)

THE LONGEST THROW

Record: 80 metres
Held by: Petra Felke (GDR)
Date: 9.9.88



THE FASTEST RACE

Record: 47.02 seconds
Held by: Ed Moses (USA)
Date: 31.8.83

400 METRES HURDLES

All photographs from ALLSPORT

RECORD BR

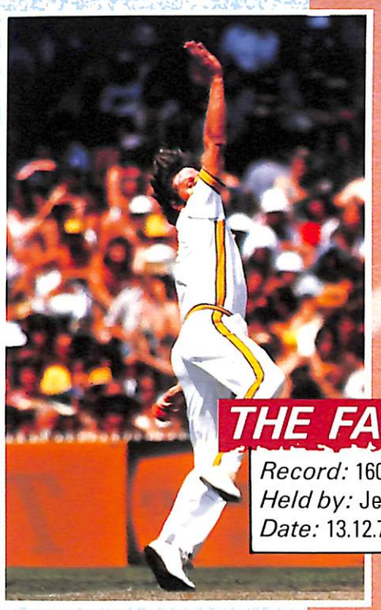
PUSHING THE BOUND

SKI JUMPING

THE LONGEST LEAP

Record: 194 metres
Held by: Piotr Fijas (POL)
Date: 14.3.87

CRICKET



THE FASTEST THROW

Record: 160.45 kph
Held by: Jeff Thomson (AUS)
Date: 13.12.75

AMERICAN FOOTBALL

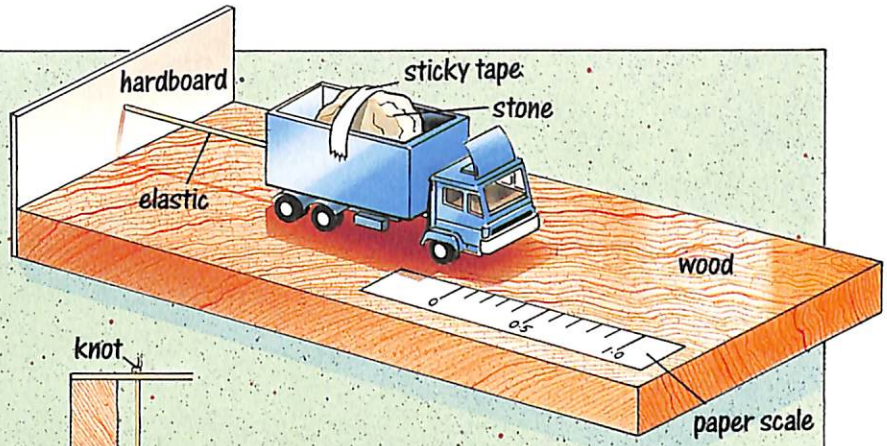
THE MOST YARDS GAINED

Record: 5084 (in one NFL season)
Held by: Dan Marino (Miami Dolphins)
Date: 1984

PROJECTS

SPORT

- How can you measure the acceleration of a vehicle?
- How can you make it less effort to lift a weight?
- Why is it easier to balance if we extend our arms?

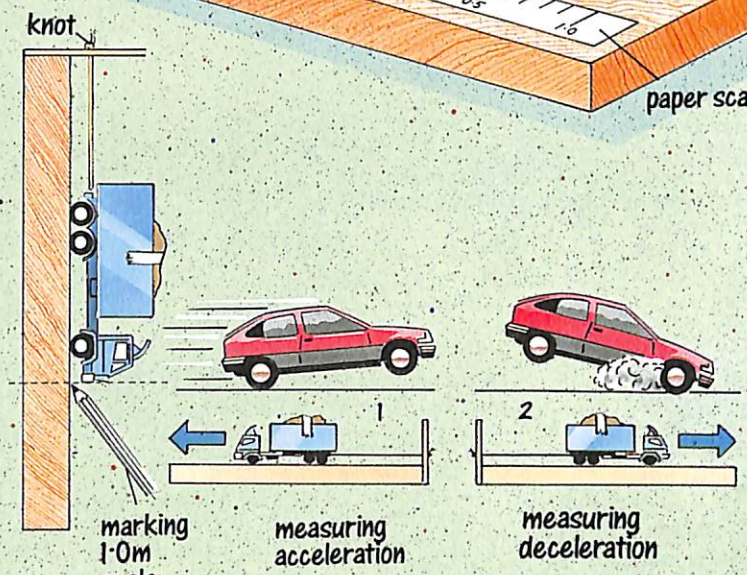


ACCELERATION

1 2 **3** 4 5

Use this simple instrument in a car or other vehicle to measure its acceleration – the rate at which its speed changes.

Make the instrument as shown. To calibrate the scale, hold the instrument upright so that the weighted truck hangs, stretching the elastic. Mark the scale opposite the front of the truck and write **1.0** against it. Next place the instrument on a level surface and mark how far the truck can reach without stretching the elastic. Write **0** against this mark. Now divide the distance between the two marks into ten equal parts and write **0.5** against the middle mark. Take the instrument into a car and place it horizontally. The diagrams show how to hold the instrument for measuring positive acceleration or speeding up, (1) and deceleration – the rate at which a vehicle slows down (2).

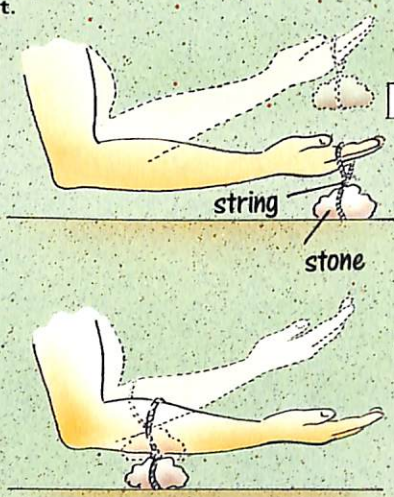


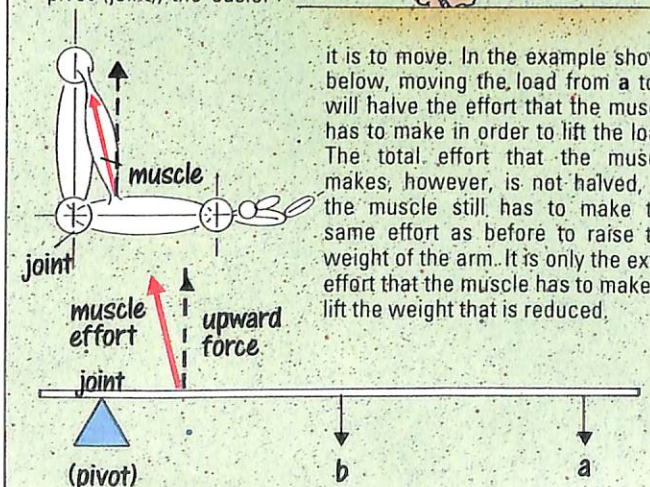
MUSCLE POWER

1 **2** **3** 4 5

We often use our arm as a simple lever to lift things. The closer objects are to the elbow, the easier they are to lift.

Tie a loop of string to a large stone. Place the loop over your hand and try lifting the stone from a horizontal surface, as shown. Now repeat the experiment, but with the loop over your arm, a short distance from the elbow – you will find that it takes much less effort to lift the stone. As in any simple lever system, the nearer the load (stone) is to the pivot (joint), the easier it is to move. In the example shown below, moving the load from **a** to **b** will halve the effort that the muscle has to make in order to lift the load. The total effort that the muscle makes, however, is not halved, as the muscle still has to make the same effort as before to raise the weight of the arm. It is only the extra effort that the muscle has to make to lift the weight that is reduced.





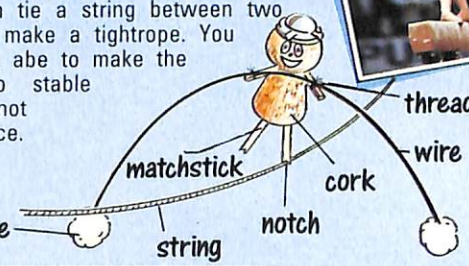
A PERFECT BALANCE

1 2 **3** 4 5

A balanced object is more stable if some of its weight is moved away from the point of balance.

Make a model man from a cork and matchsticks, as shown. Tie a length of stiff wire to its arms and fix some Plasticine weights to the ends of the wire, then tie a string between two chairs to make a tightrope. You should be abe to make the model so stable that it cannot overbalance.

Allsport/Bob Martin



PROJECT INFORMATION

1 2 **3** 4 5

Each **QUEST** project has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.

WARNING!

Parents should supervise experiments involving sharp tools, water and electricity. The publisher can accept no responsibility for injury.

MODEL WILLIAMS RENAULT V10

ASSEMBLY INSTRUCTIONS

You will need

Scissors • Ruler • Craft knife • Glue
Two 124mm lengths of 3mm dowelling or thin plastic straws.

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Study the ASSEMBLY DIAGRAM to see how the pieces fit together, and use dotted lines as a guide for positioning.

To make up

Turret

1 Cut out floor **A**. Fold tabs up.
2 Cut out body **B**. Pierce holes large enough to push dowel or straw through where indicated. Cut flaps with a craft knife and fold up. Fold to shape to form sides and top of body.
3 Cut out body back **C**. Fold to shape and glue tabs to underside edges of sides of body **B** and tabs of **B** to underside edge of **C**.
4 To join body **B** to floor **A**, glue tabs on one side of body **B** to edge of floor **A**, and tab of **A** to inside edge of **B**. Glue the other side of body **B** to **A** in the same way.

Nose

1 Cut out nose cone **D**, **E**. Fold to shape.
2 Cut out nose cone instrument housing **F**. Fold and glue to shape. Glue tab of **D** to underside edge of nose cone **F**. Glue tab of **E** to nose cone **F** in the same way.
3 To join completed cone to body, glue tabs of **D** and **E** to underside edges of body **B**, and tabs of **B** to underside edges of **D** and **E**. Gently pinch instrument housing section of **F** to shape and glue in position on tabs of body **B**.

Radiator pads

1 Cut out radiator pad **G**. Fold and glue tabs at narrow end to shape.
2 Cut out radiator pad **H**. Fold tab and glue to inside edge of **G**.
3 To join radiator pad to body, apply glue to flap on body **B** and, keeping back of radiator pad **G/H** aligned with back of body, press in position on flap. Glue tab on **G** to bottom edge of body **B** (see ASSEMBLY DIAGRAM).
4 Repeat this process with radiator pad **I**, **J**, and glue in position on the other side of body **B**.

Engine cover and wings

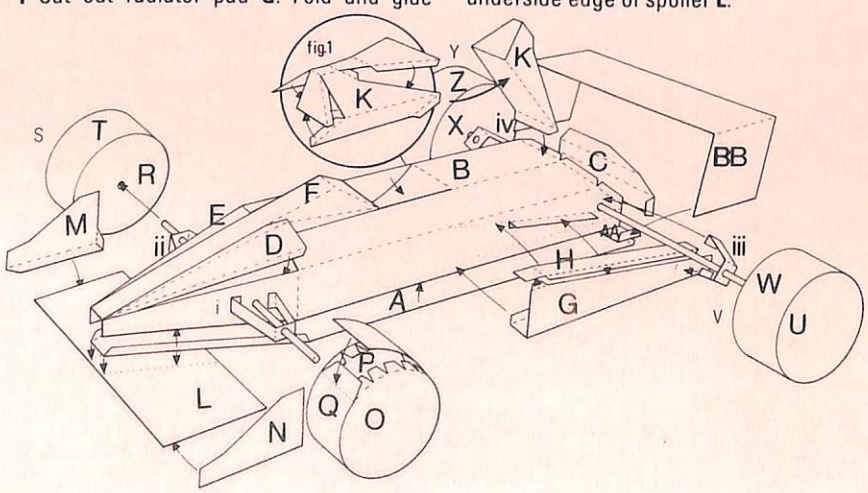
1 Cut out engine cover **K**. Fold and glue to shape (see Fig 1), leaving tab at narrow end of engine cover pushed down. Glue this tab in position on body **B** (see ASSEMBLY DIAGRAM).
2 Cut out front spoiler **L**. Apply glue to area indicated inside dotted lines and press in position under nose of body.
3 Cut out front wing **M**. Fold and glue tabs to form right-angled corner. Glue tab to underside edge of spoiler **L**.
4 Repeat this process with front wing **N** and glue in position on **L**.

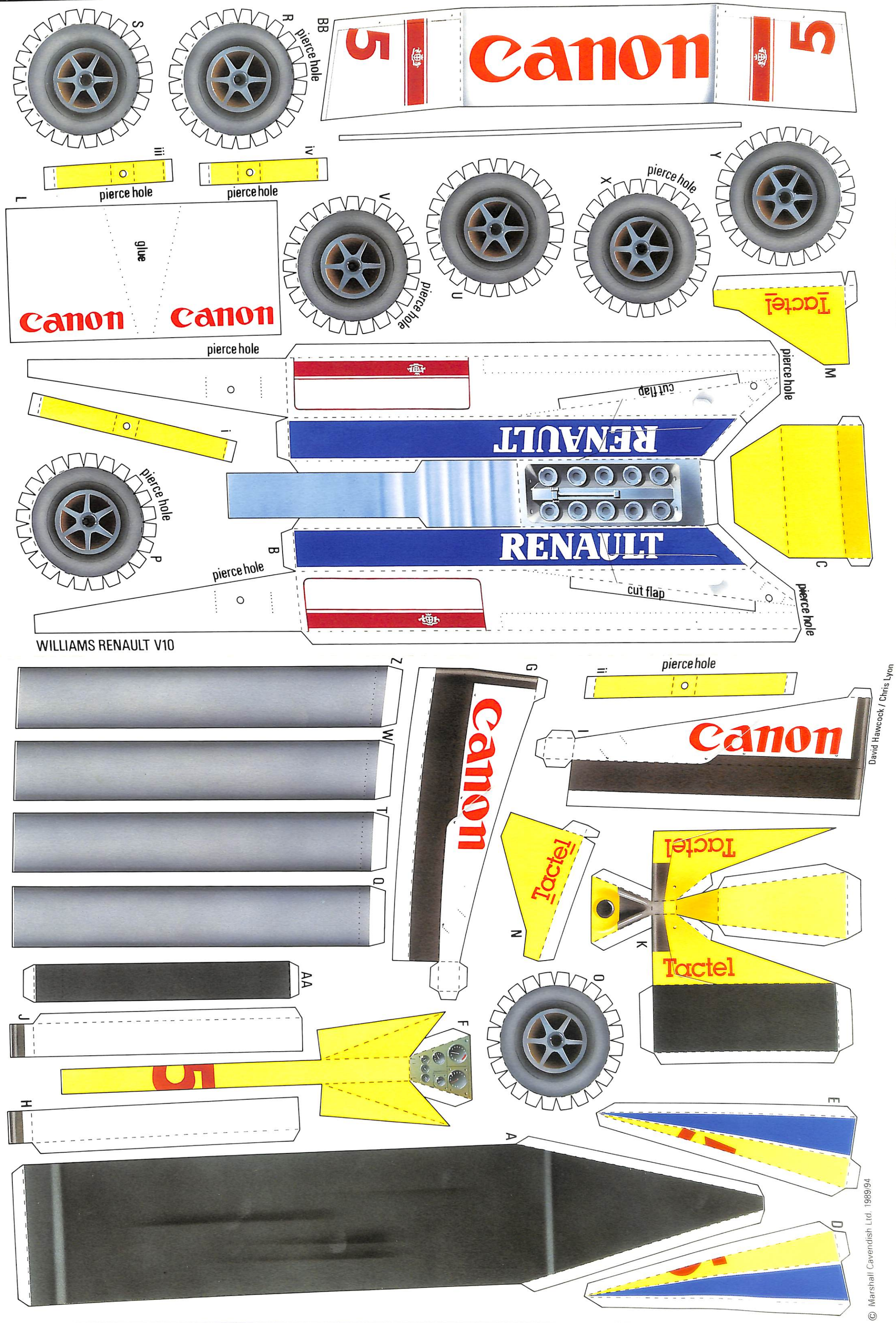
Wheels

1 Cut out wheel **O**. Fold tabs down.
2 Cut out wheel **P**. Pierce hole large enough to push dowel or straw through and push tabs down.
3 Cut out tyre **Q**. Glue tabs of wheel **O** on to edge of tyre **Q**, leaving the last few tabs unstuck.
4 Glue tabs of wheel **P** on to opposite edge of tyre **Q**, and glue remaining tabs of **O** on to tyre **Q** to complete the wheel (see ASSEMBLY DIAGRAM).
5 Repeat this process with wheel **R**, **S**, tyre **T**; wheel **U**, **V**, tyre **W**; wheel **X**, **Y**, tyre **Z**.
6 Cut out front wheel mounting **i**, **ii**. Pierce hole in each large enough to push dowel or straw through and fold to shape. Glue in position on either side of body **B**.
7 Repeat this process with rear wheel mounting **iii**, **iv** and glue in position at rear of body **B**, radiator pad **G** and **I**.

To finish

1 Cut out rear spoiler mounting **AA**. Glue in position on underside edge of floor **A**.
2 Cut out rear spoiler **BB**. Fold to shape and glue in position on tabs of **AA**.
3 To attach front wheels, apply glue to one end of one length of dowelling or straw and gently push it through hole on wheel **P**, allowing it to stick to inside edge of wheel **O**, without piercing wheel.
4 Push other end of dowel or straw through holes in wheel mountings **i**, body **B**, wheel mounting **ii**. Apply glue to end of dowel or straw and push through wheel **R**, allowing it to stick to inside edge of wheel **S**, without piercing wheel.
5 Repeat this process to attach rear wheels.

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David Hawcock / Chris Lyon
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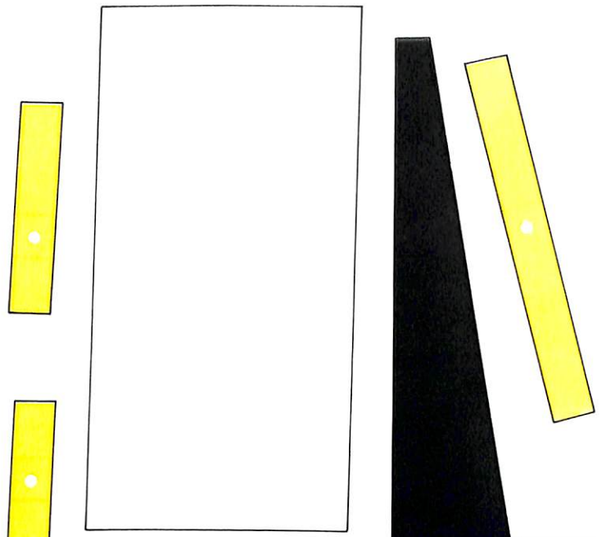

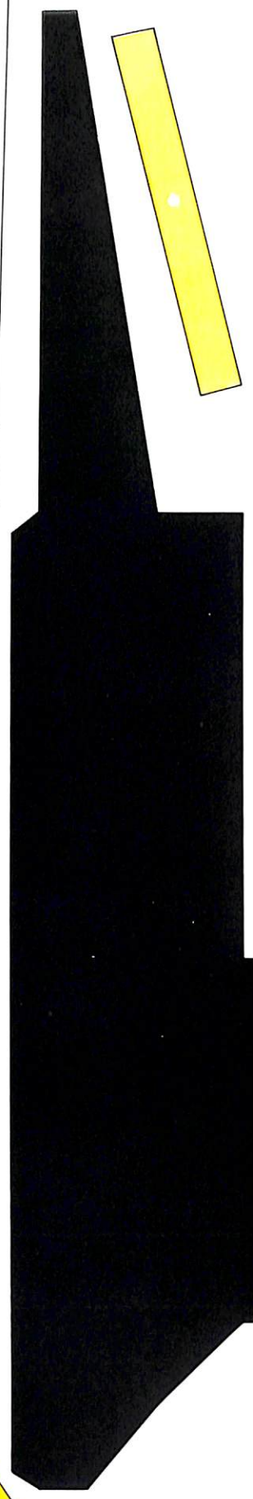

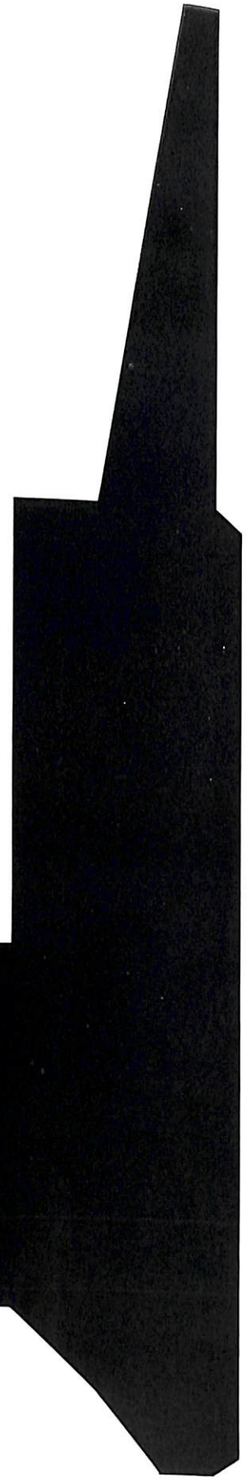

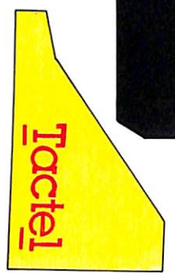
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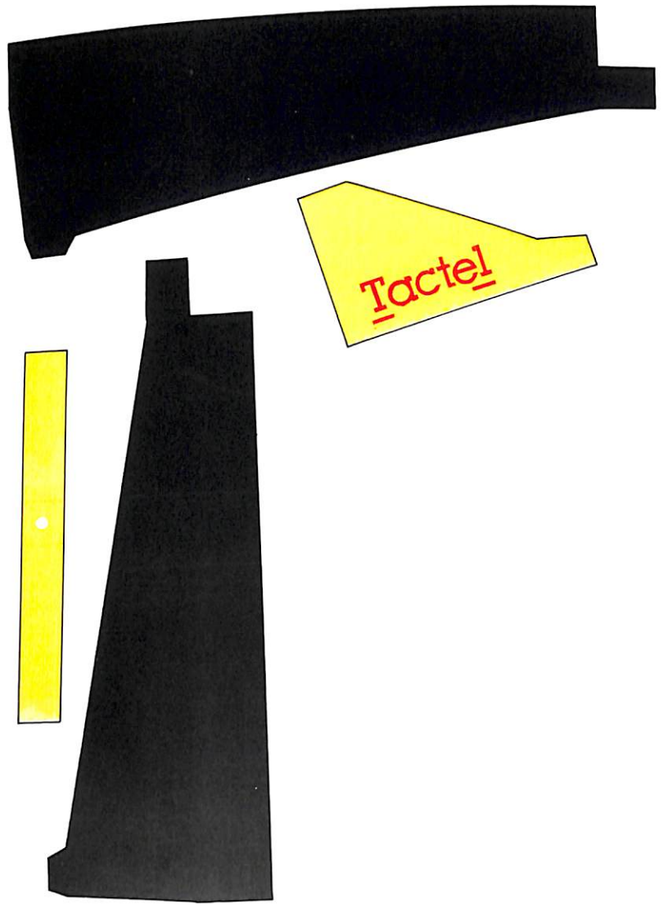

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